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Examiner: George C. Monikang

The claims:

- 1 (Currently amended). A method of processing sound data received at one or more microphones from a speaker subject to be transmitted to a listener subject, the method comprising the steps of: receiving a transmission having sound data and an audio source spatial data set relative to the one or more microphones;
determining, in a sound conditioning filter database having filters characterized by a stored set of coefficients wherein each stored set of filter coefficients is a function of at least one element of the audio source spatial data set, two or more stored sets of coefficients proximate to the at least one element of the audio source spatial data set;
interpolating between the determined two or more stored sets of coefficients;
convolving the sound data with a shaping filter having the interpolated filter coefficients;
transmitting the resulting signal to a sound-producing array; and
using the sound-producing array to determine at least one of the head orientation and torso orientation of the listener subject in a first position;
using the sound-producing array to determine at least one of the head orientation and torso orientation of the listener subject in a second position, with the listener subject being rotated in the second position relative to the listener subject in the first position; and adjusting the sound data transmitted to the listener subject in response to the sound-producing array making the determination that the listener subject rotated to the second position.
- 2 (original). The method of claim 1 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.
- 3 (original). The method of claim 1 wherein the spatial data set comprises a first audio source angle of incidence relative to the one or more microphones.

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4 (original). The method of claim 3 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

5 (original). The method of claim 3 wherein the spatial data set further comprises a second audio source angle of incidence relative to the one or more microphones, the second audio source angle of incidence being substantially orthogonal to the first audio source angle of incidence.

6 (original). The method of claim 5 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

7 (original). The method of claim 1 further comprising the step of determining a first audio source angle of incidence relative to the one or more microphones for inclusion in the spatial data set.

8 (original). The method of claim 7 further comprising the steps of:
determining, for a voice-over-Internet Protocol session, a nominal audio source distance set point relative to the one or more microphones; and
determining an audio source distance setting relative to the determined nominal distance set point for inclusion in the spatial data set.

9 (original). The method of claim 7 further comprising the step of determining a second audio source angle of incidence relative to the one or more microphones, the second audio source angle of incidence being substantially orthogonal to the first audio source angle of incidence for inclusion in the spatial data set.

10 (original). The method of claim 9 further comprising the steps of:
determining, for a voice-over-Internet Protocol session, a nominal audio source distance set point relative to the one or more microphones; and

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determining an audio source distance setting relative to the determined nominal distance set point for inclusion in the spatial data set.

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11 (original). The method of claim 1 further comprising the steps of:

encapsulating the sound data and an audio source spatial data set relative to the one or more microphones into packets;
transmitting via a network the packets; and
receiving and de-encapsulating from the packets the sound data and the audio source spatial data set.

12 (original). The method of claim 1 further comprising the steps of:

encoding the sound data and an audio source spatial data set relative to the one or more microphones into telephone signals;
transmitting via a circuit switched network;
receiving and de-encoding from the telephone signals the sound data and the audio source spatial data set.

13 (original). The method of claim 1 wherein the sound-producing array is comprised of headphones.

14 (original). The method of claim 1 wherein the sound-producing array is comprised of a plurality of audio speakers.

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15 (previously presented). A method of spatial filter tuning for sound data transmitted from a speaker subject to a listener subject, comprising

transmitting sound waves toward the listener subject having a torso and a head via a sound-producing array;

receiving the reflected sound waves via one or more microphones;

processing the received sound waves to determine time-relative rotation changes in listener subject head orientation and listener subject torso orientation;

translating the determined time-relative changes in listener subject orientation into changes in an audio source spatial data set;

determining, in a sound conditioning filter database having filters characterized by a stored set of coefficients wherein each stored set of filter coefficients is a function of at least one element of the audio source spatial data set, two or more stored sets of coefficients

proximate to the at least one element of the audio source spatial data set;

interpolating between the determined two or more stored sets of coefficients,

convolving the sound data with a shaping filter having the interpolated filter coefficients; and

transmitting the resulting signal to the sound-producing array.

16 (original). The method of claim 15 wherein the spatial data set further comprises an audio source distance setting relative to the one or more microphones.

17 (original). The method of claim 15 wherein the spatial data set comprises a first audio source angle of incidence relative to the one or more microphones.

18 (original). The method of claim 17 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

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19 (original). The method of claim 17 wherein the spatial data set further comprises a second audio source angle of incidence relative to the one or more microphones, the second audio source angle of incidence being substantially orthogonal to the first audio source angle of incidence.

20 (original). The method of claim 19 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

21 (original). The method of claim 15 further comprising the step of determining a first audio source angle of incidence relative to the one or more microphones for inclusion in the spatial data set.

22 (original). The method of claim 15 further comprising the steps of:

determining, for a session, a nominal audio source distance set point relative to the one or more microphones; and

determining an audio source distance setting relative to the determined nominal distance set point for inclusion in the spatial data set.

23 (original). The method of claim 15 further comprising the step of determining a second audio source angle of incidence relative to the one or more microphones, the second audio source angle of incidence being substantially orthogonal to the first audio source angle of incidence for inclusion in the spatial data set.

24 (original). The method of claim 15 wherein the sound-producing array is comprised of headphones.

25 (original). The method of claim 15 wherein the sound-producing array is comprised of a plurality of audio speakers.

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26 (currently amended). A system for spatial audio source tracking and representation comprising:

- one or more microphones;
- a microphone processing interface for providing a sound data stream and an audio source spatial data set;
- a processor for modifying spatial filters based on the audio source spatial data set and for shaping the sound data stream with modified spatial filters; and a sound-producing array, said sound-producing array operable to determine at least one of the head orientation and torso orientation of a listener subject in a first position, and said sound-producing array further operable to determine at least one of the head orientation and torso orientation of a listener subject in a second position, with the listener subject being rotated in the second position relative to the listener subject in the first position; said processor further for modifying the sound data stream in response to said sound-producing array determining at least one of the head orientation and torso orientation of the listener subject in the second position.

27 (original). The system of claim 26 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

28 (original). The system of claim 26 wherein the spatial data set comprises a first audio source angle of incidence relative to the one or more microphones.

29 (original). The system of claim 28 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

30 (original). The system of claim 28 wherein the spatial data set further comprises a second audio source angle of incidence relative to the one or more microphones, the second audio source angle of incidence being substantially orthogonal to the first audio source angle of incidence.

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31 (original). The system of claim 30 wherein the spatial data set comprises an audio source distance setting relative to the one or more microphones.

32 (original). The system of claim 26 wherein the system further comprises:

a first communication processing interface for encapsulating the sound data and an audio source spatial data set relative to the one or more microphones into packets; and transmitting via a network the packets; and

a second communication processing interface for receiving the packets and de-encapsulating sound data and the audio source spatial data set.

33 (original). The system of claim 26 wherein the system further comprises:

a first communication processing interface for encoding the sound data and an audio source spatial data set relative to the one or more microphones into telephone signals; and transmitting via a circuit switched network; and

a second communication processing interface for receiving the telephone signal and de-encoding the sound data and the audio source spatial data set.

34 (original). The system of claim 26 wherein the sound-producing array is comprised of headphones.

35 (original). The system of claim 26 wherein the sound-producing array is comprised of a plurality of audio speakers.